

# Upper Rio Grande Water Operations Model (URGWOM)

Current Status of RiverWare Model for Simulation  
of the Rio Grande Flow  
for the Rio Grande Project

Sponsored by U.S. Army Corps of Engineers

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Paso del Norte Watershed Council

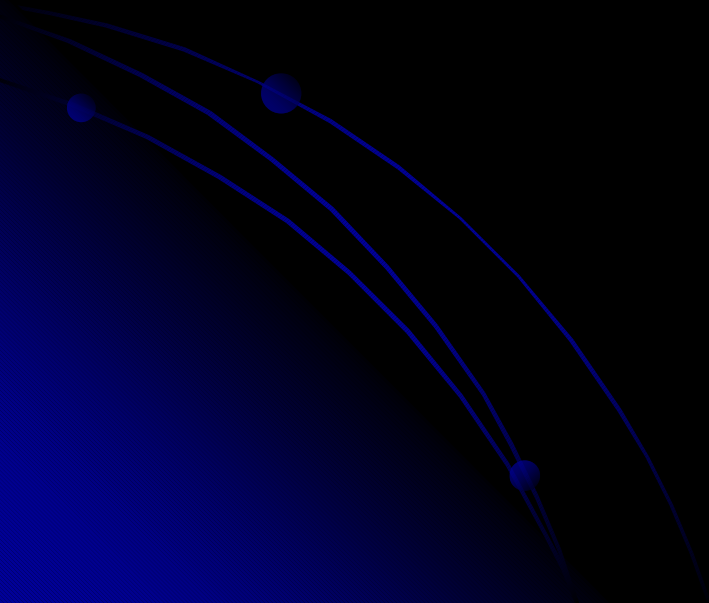


Citizen Forum

U.S. International Boundary and Water Commission  
September 8 2008



# Outline

- What are URGWOM and RiverWare?
  - What is URGWOM designed for?
  - What has been done for the RG Project area?
  - What is next step?
- 

# What is URGWOM?

Upper Rio Grande Water Operations Model - Windows Internet Explorer


http://www.spa.usace.army.mil/urgwom/default.asp


URGWOM

Upper Rio Grande Water Operations Model

HOMEPAGE CONTACT US MISSION HISTORY RELATED LINKS KIDS CORNER

 US Army Corps of Engineers®  
Albuquerque District

 **URGWOM**

 **RELEVANT  
READY  
RESPONSIVE  
RELIABLE**  
*Proudly serving the Armed Forces and  
the Nation now and in the future.*

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## What is the Upper Rio Grande Water Operations Model?

**What is URGWOM?**

In 1996, six federal agencies - the Bureau of Reclamation, U.S. Fish and Wildlife Service, U.S. Geological Survey, Bureau of Indian Affairs, the International Boundary and Water Commission (U.S. Section), and the U.S. Army Corps of Engineers - recognized the need for a unified water operations model for the Upper Rio Grande Basin and entered into a Memorandum of Understanding (MOU) to develop such a tool to assist water managers. The interest of this cooperative effort is to develop a numerical computer model capable of simulating water storage and delivery operations in the Rio Grande from its headwaters in Colorado to below Caballo Dam in New Mexico and for flood control modeling from Caballo Dam to Fort Quitman, Texas. The model will be used in flood control operations, water accounting, and evaluating water operations alternatives. To aid in modeling the Upper Rio Grande, a data base will also be developed to store the vast amount of data necessary to develop and maintain the model. Additional entities signing the MOU in 1997 were the cities of Albuquerque and Santa Fe, Rio Grande Restoration, Sandia and Los Alamos National Laboratories. Many other entities, although not yet signatories, are involved in the effort through technical review and outreach support.

**Eleven reservoir and river simulation models were evaluated based on general criteria for their use as the URGWOM simulation model. Based on the results of the technical evaluation and the goals and needs defined in the MOU, the Steering Committee unanimously agreed that RiverWare had the greatest likelihood of successfully being developed for the Upper Rio Grande Water Operation Model.**

**What is RiverWare?**

[Final EIS and ROD](#)

[About the Basin](#)

[Purpose and Need for the Model](#)

[Model Data](#)

[Model Documentation](#)

[Quality Control Plan](#)

[URGWOM News](#)

[Meetings and Activities](#)

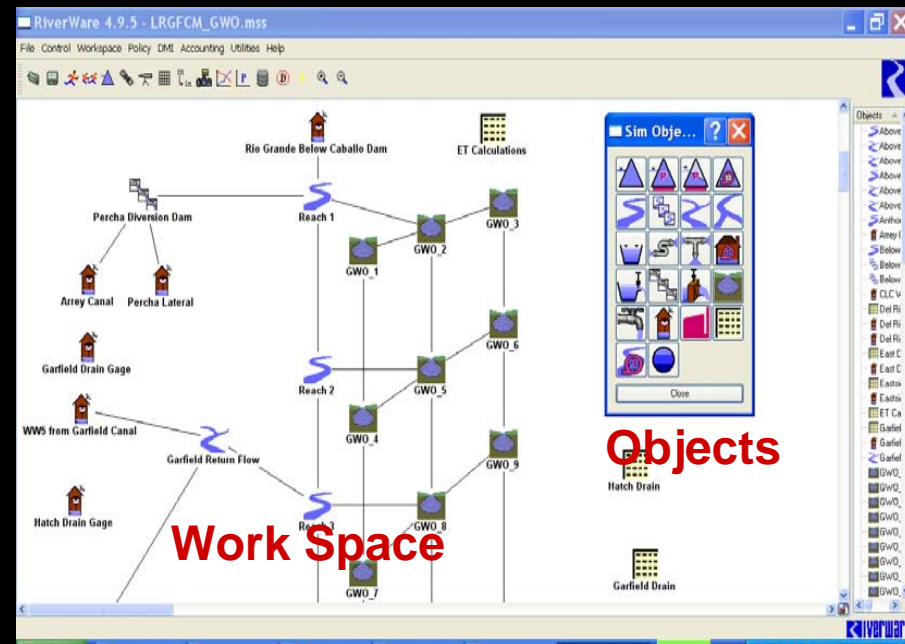
[Other Web Sites](#)

- 6 Federal Agencies (USBR, USFWS, USGS, BIA, IBWC & USACE) MOU in 1996.
- Develop a unified water operations model for the Upper RG Basin to assist water managers.

<http://www.spa.usace.army.mil/urgwom/default.asp>

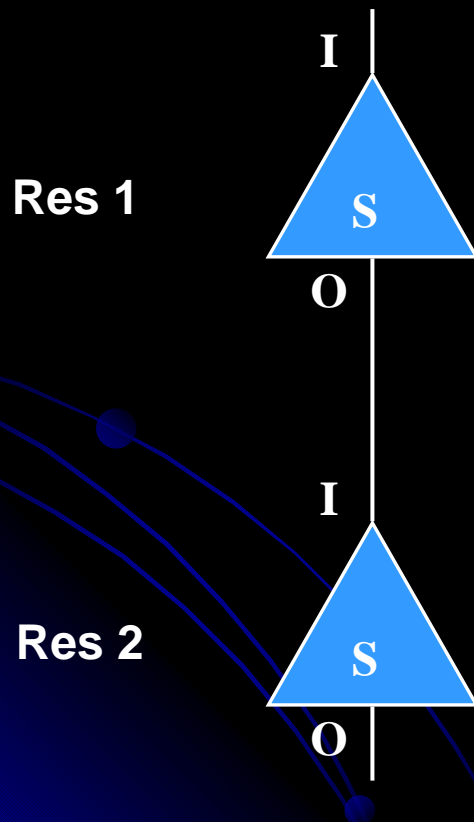
# What is RiverWare?

- Generalized river basin modeling tool developed by CADSWES (Center for Advanced Decision Support for Water and Environmental Systems)
- Key Elements: Reach Object, Reservoir Object, Stream Gage Object, Groundwater Object and Data Object
- Multiple solution methodologies: simulation, simulation with rules, and optimization



# What is RiverWare?

## Object Oriented Model



Solution Equation used depends on knowns and unknowns

$$S_t = S_{t-1} + I_t - O_t$$

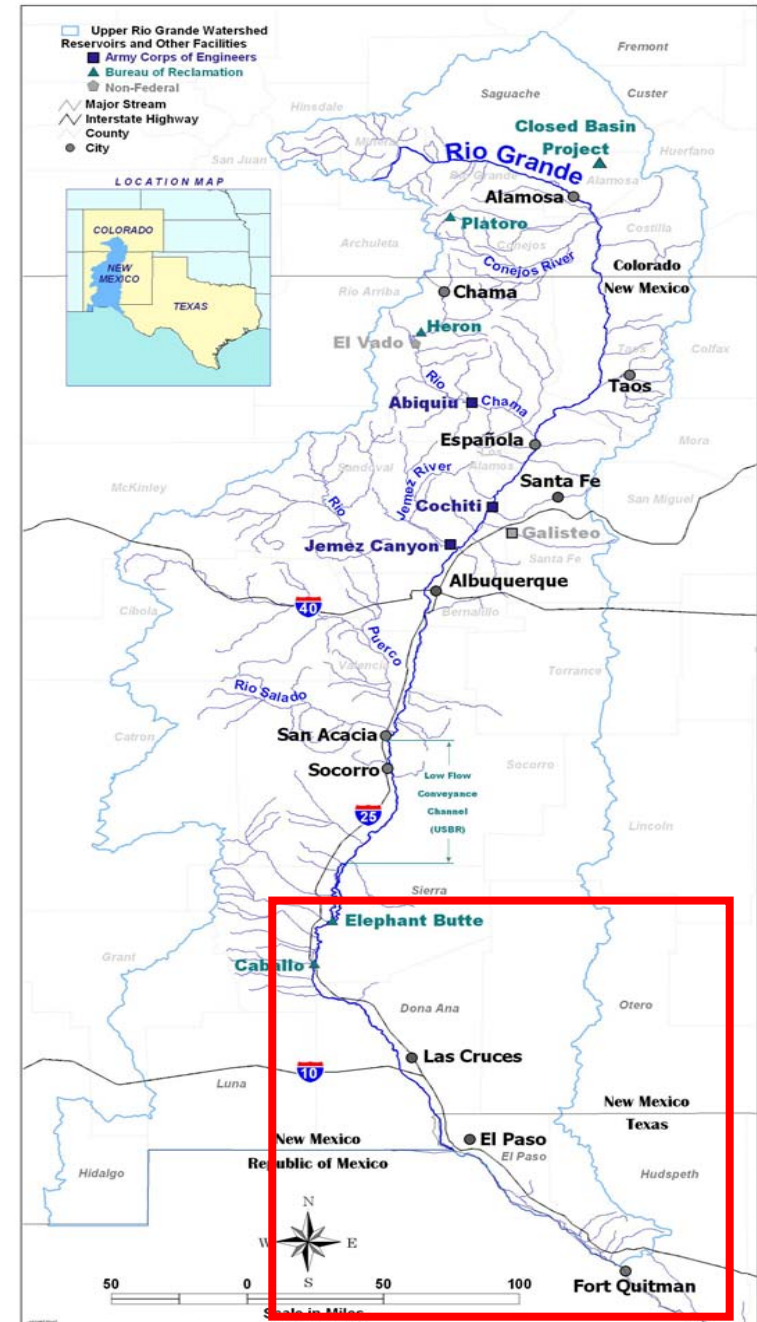
$$I_t = S_t + O_t - S_{t-1}$$

$$O_t = S_t + I_t - S_{t-1}$$

Links propagate values Exactly determined system

# What is URGWOM designed for?

- Four Daily Time-Step Models: Forecasting, Accounting, Water Operations, & Planning for Upper part
- Flood control for the reaches within the Rio Grande Project area







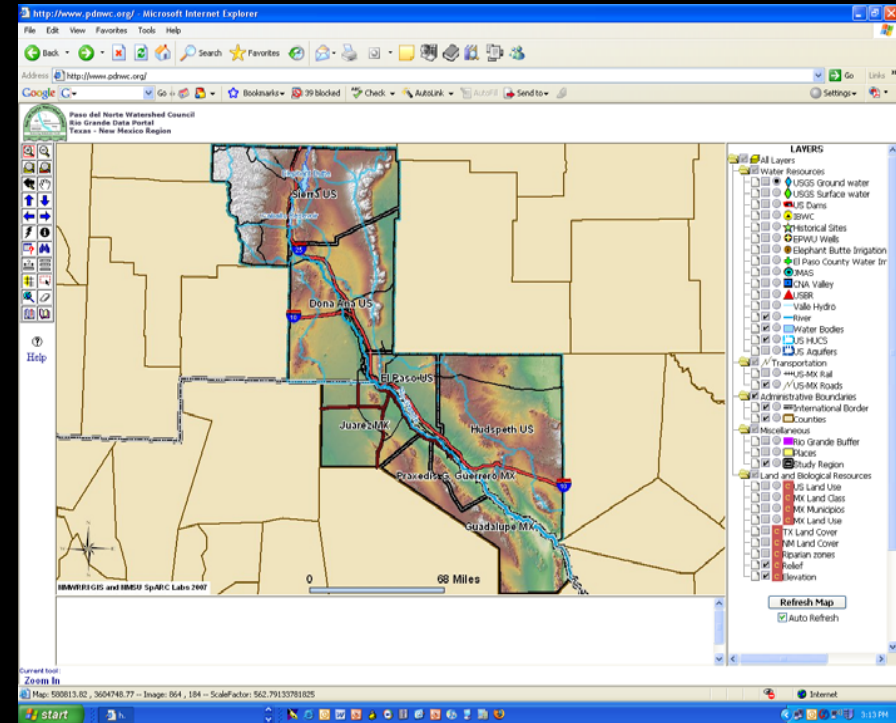
# What has been done for the RG Project area? (1)

- Water Resources Database (EPWU, USACE, USBR and USDA)

- Two technical reports:

<http://wrrri.nmsu.edu/publish/techrpt/abstracts/abs327.html>

<http://wrrri.nmsu.edu/publish/techrpt/abstracts/abs341.html>

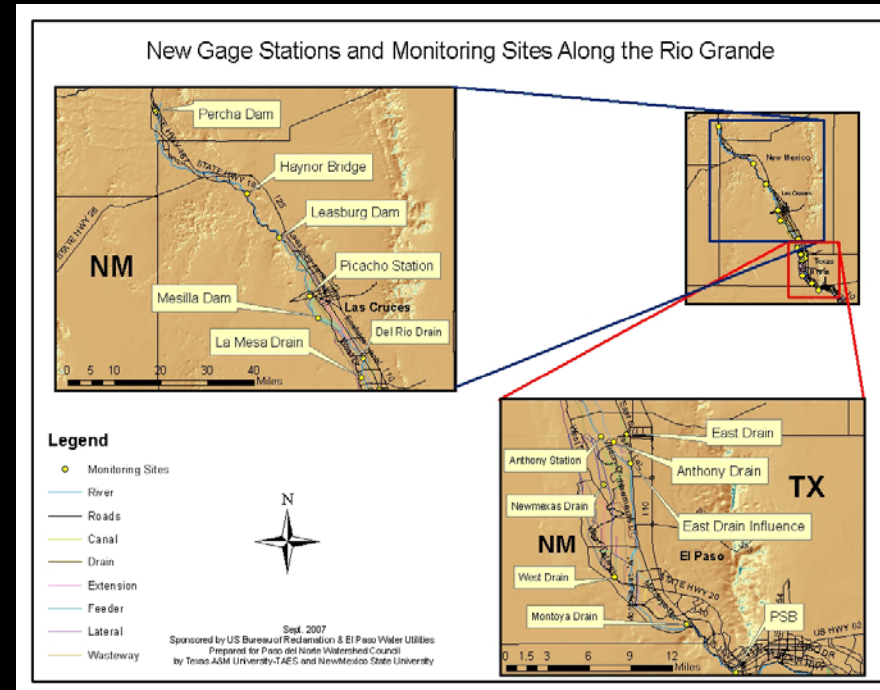




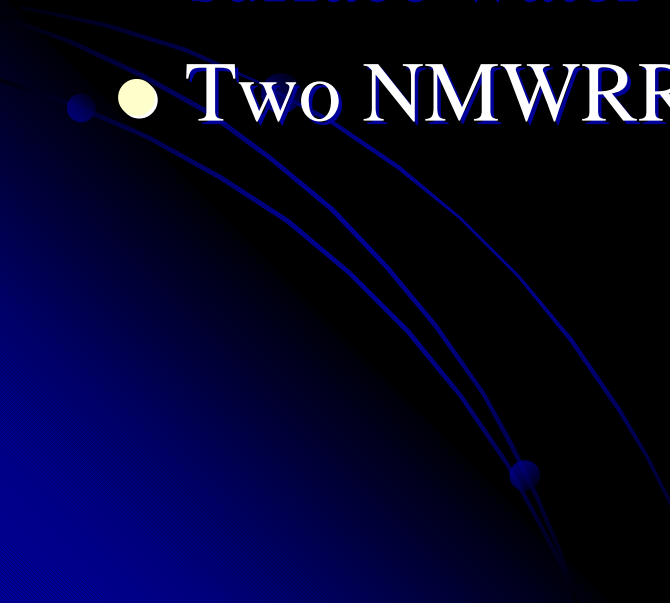
# What has been done for the RG Project area? (2)

- Enhancement of water monitoring network (USBR 2025 Water Challenge Grant and EPWU)
- One TWRI-NMWRRI Technical Report in print

<http://wrrri.nmsu.edu/publish/techrpt/abstracts/abs344.html>

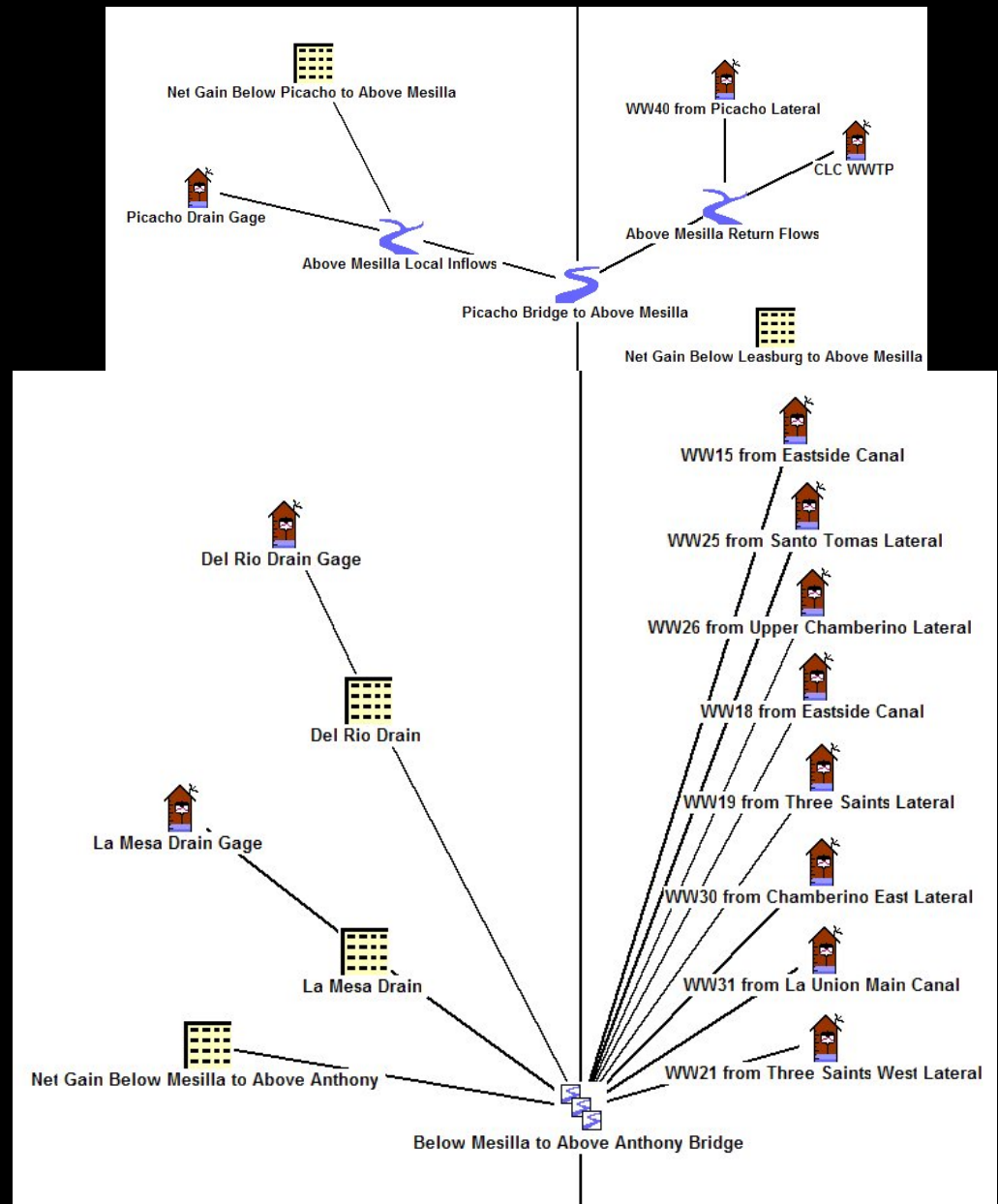


# What has been done for the RG Project area? (3)

- Flood control planning model
  - Monthly time step
  - Enhancement with GW objects to simulate surface water and groundwater interaction
  - Two NMWRRI-TWRI technical reports.
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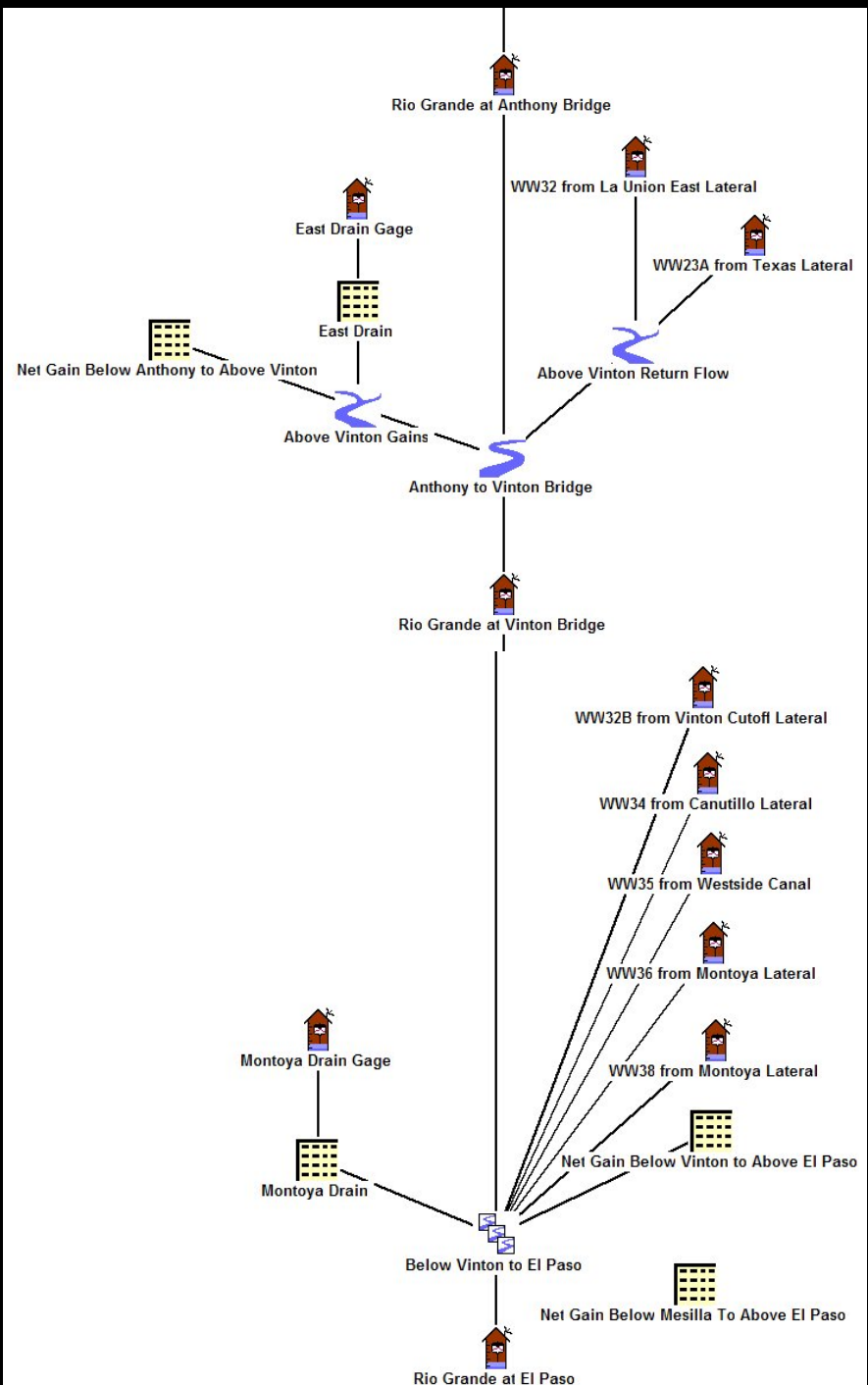
# RiverWare Model Layout

## Mesilla Reach to Above Anthony Bridge



# RiverWare Model Layout

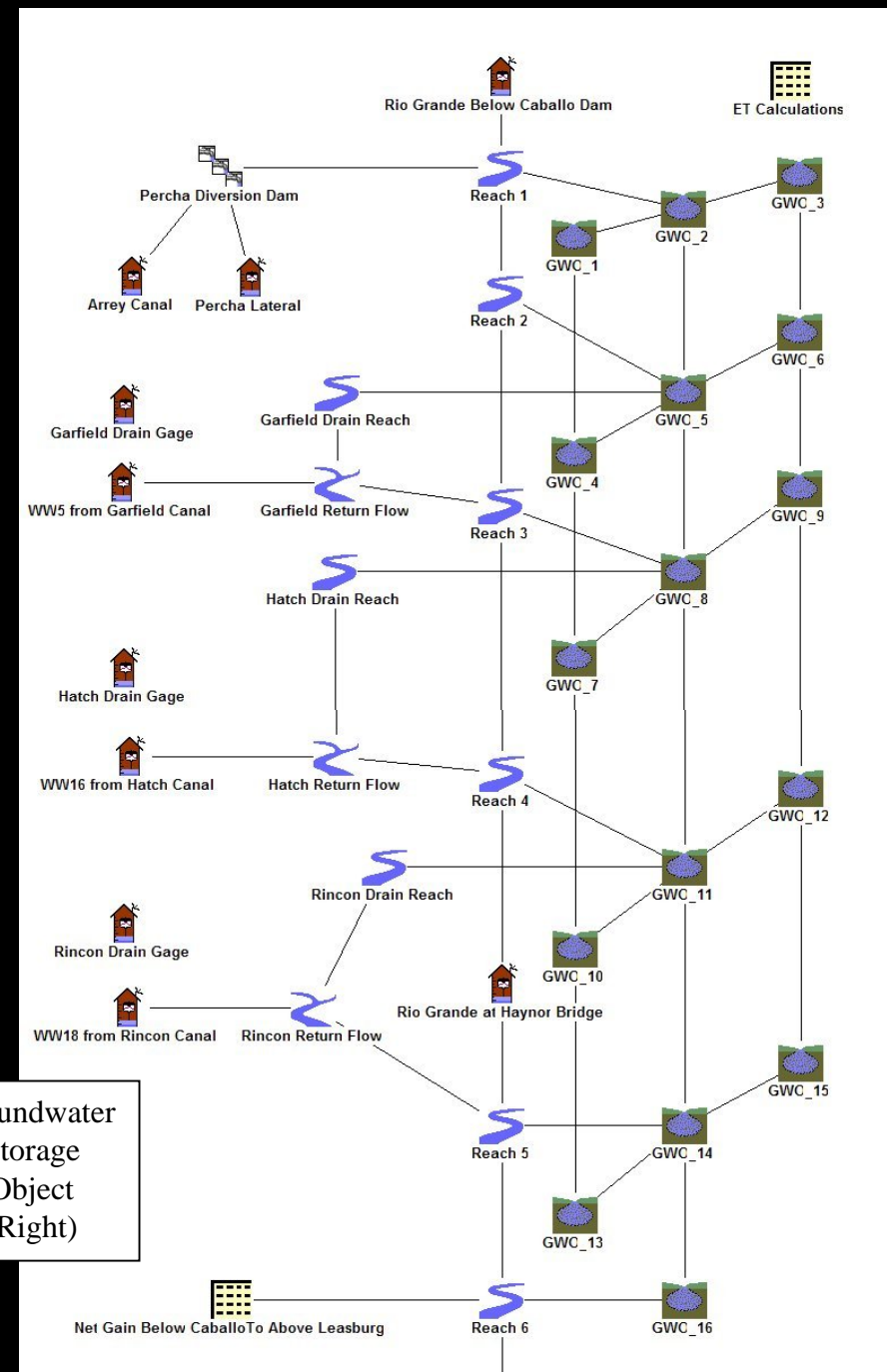
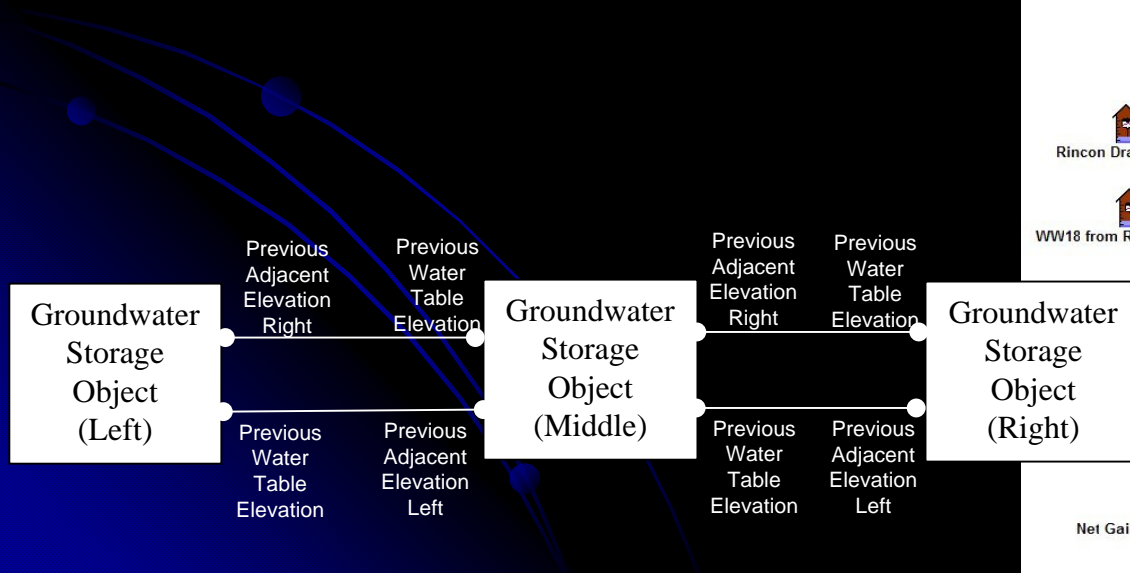
## Mesilla Reach to Below Anthony Bridge



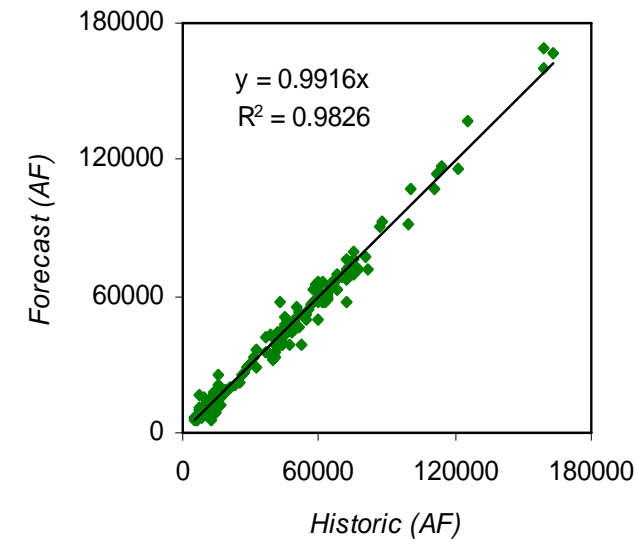
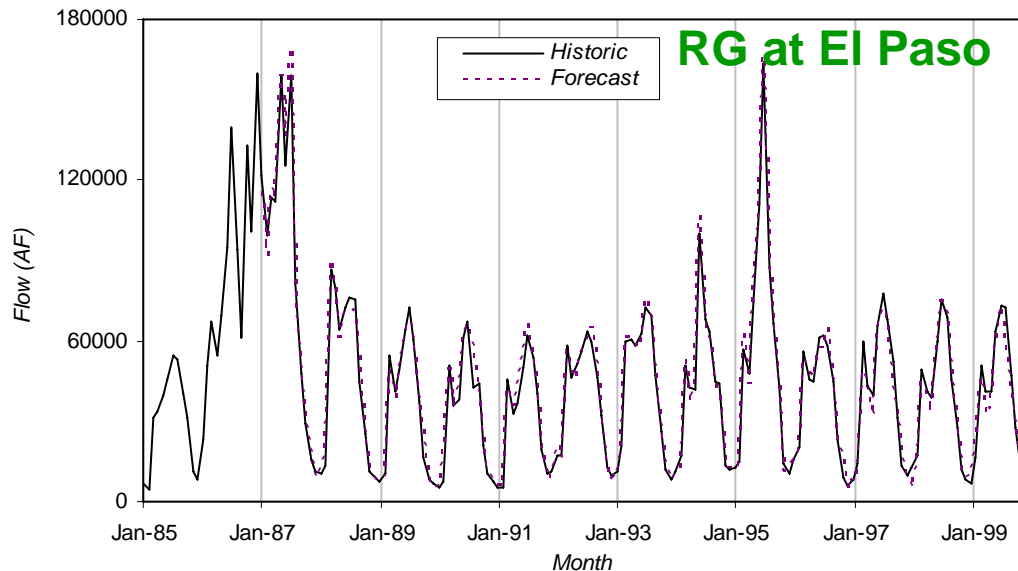
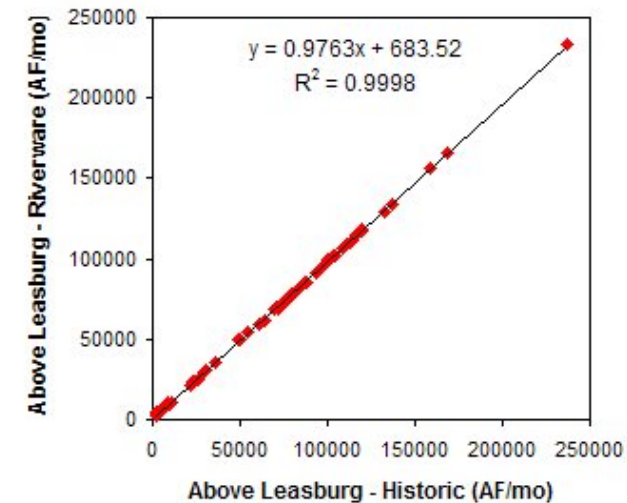
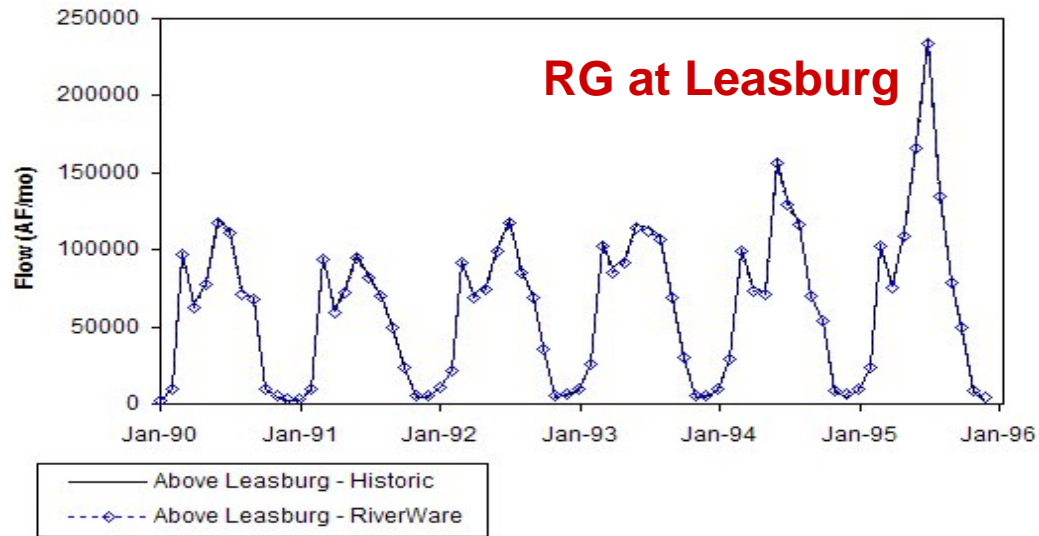


# RiverWare Model Layout

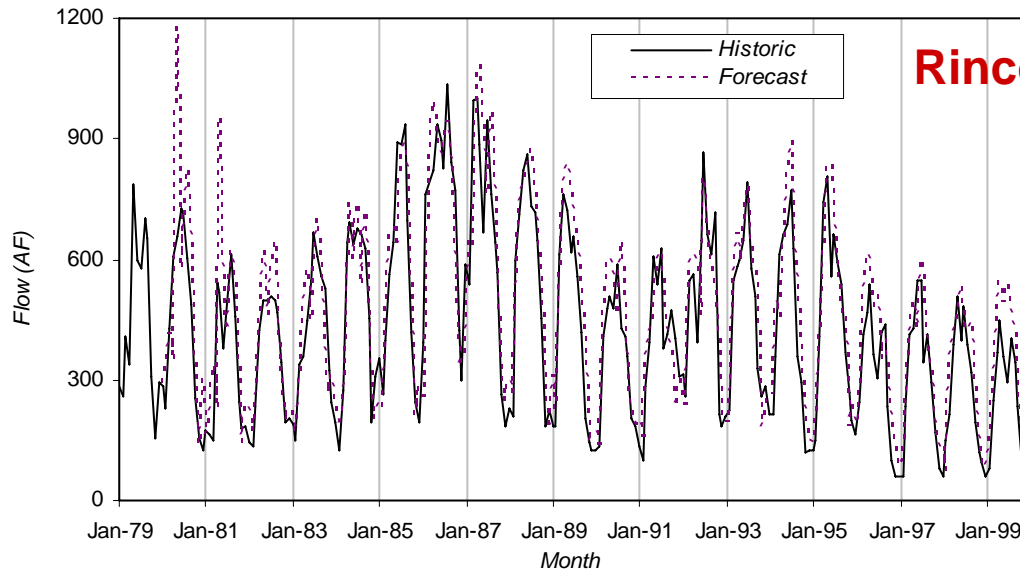
## Enhancement with Groundwater Objects in Rincon Valley



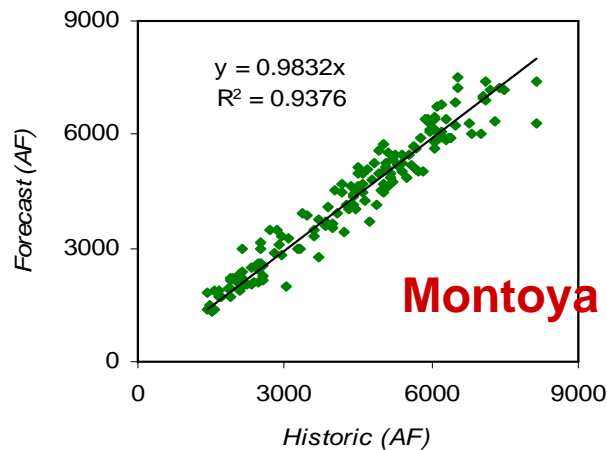
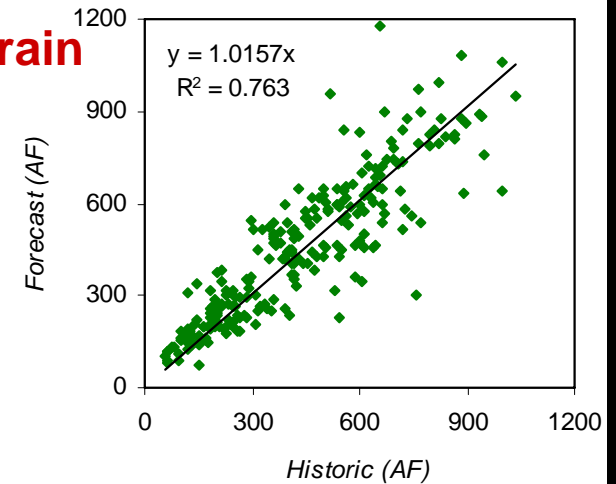
# RiverWare Simulation Results



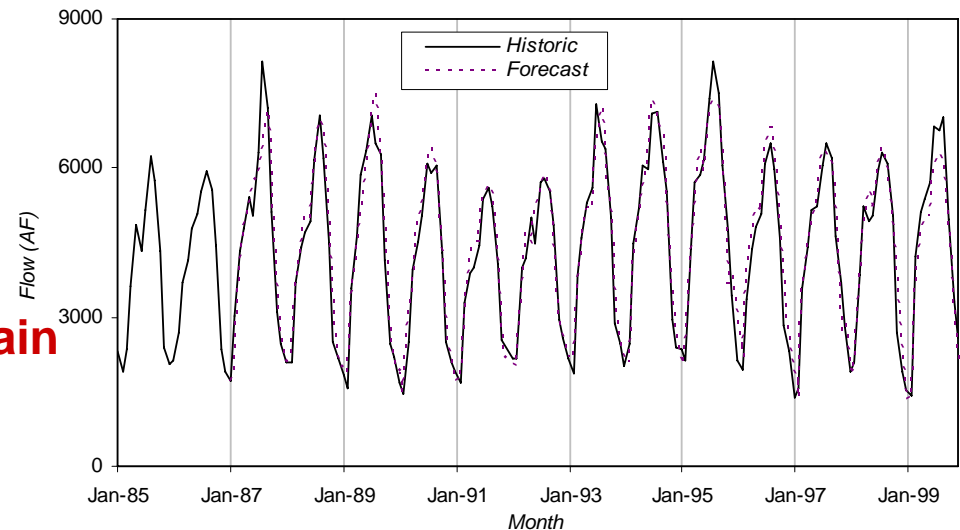
# RiverWare Simulation Results




Rincon Drain



Montoya Drain



# What next?

- Enhancement of the RiverWare model for flood control
  - Potential for assessment of new operating agreement
  - Water quality assessment for salinity management
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# Acknowledgment

- U.S. Army Corps of Engineers
- U.S. Bureau of Reclamation
- U.S. Geological Survey
- U.S. International Boundary and Water Commission
- U.S. Department of Agriculture, CSREES
- Paso del Norte Watershed Council
- El Paso Water Utilities
- Elephant Butte Irrigation District
- El Paso County Water Improvement District No. 1
- City of Las Cruces
- Texas Commission for Environmental Quality
- New Mexico Office of State Engineer
- New Mexico State University
- Texas AgriLife Research

# PdNWC Tech Committee

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Thank You!

